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TITLE: METHOD AND APPARATUS FOR PRODUCING
POLYURETHANE SHEET

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ABSTRACT:

PROBLEM TO BE SOLVED: To continuously and stably over a long time produce a polyurethane sheet by applying a two-component reaction type thermosetting polyurethane raw material continuously and stably over a long time on a base material.

SOLUTION: The mixed two-component reaction type thermosetting polyurethane raw material is discharged on the upper surface of the base material 1 traveling horizontally by a mixing head 3. The discharged raw material, while being held between a release sheet 2 supplied from above and

the base material 1, is passed between coating rollers 6a and 6b to be constant in thickness and further through an auxiliary heating furnace 9 and a curing heating furnace 10 to be cured. After that, the release sheet 2 is peeled off, and the polyurethane sheet 15 obtained by the peeling of the release sheet 2 is taken up by a polyurethane sheet winding machine 14.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of a polyurethane sheet and manufacturing installation which produce the polyurethane sheet which has the structure which carried out the laminating of the thermosetting polyurethane to one side or both sides of a base material by carrying out coating of the thermosetting polyurethane raw material of 2 liquid reaction type to a base material continuously.

[0002]

[Description of the Prior Art] As an approach of carrying out the laminating of the thermosetting polyurethane of 2 liquid reaction type to a base material, conventionally Cast molding which carries out impregnation hardening of the urethane raw material which used the mixed injector and was mixed in the mold which inserted the base material, Only the approach of spraying and hardening an urethane raw material to a base material using 2 liquid collision mixing spray equipment or a POURETAN layer is fabricated first, and the laminating approaches performed to a batch type, such as the approach of carrying out the laminating of this polyurethane layer to a base material through a glue line, are established after that.

[0003] On the other hand, since the above-mentioned urethane raw material was referred to as manufacturing improvement in productivity, and a long sheet, the continuous system laminating approach which carries out coating to a base material continuously was desired. However, with the conventional continuation coating technique, since an urethane reaction hardened material adhered to one part of the manufacturing installations, production which carried out long duration

stability was not completed. That is, it becomes the cause which the phenomenon in which the gelation object grows up to be the wall of the pan which is in arrears with the doctor knife [to which an urethane raw material adheres directly since the reaction of a mixing-after 2 liquid mixing urethane raw material progresses by the coating approach using a knife coating-machine, roll coater, and die coating machine etc. and gelation advances serially], roll, die, or mixing urethane raw material etc. in time amount is seen, and causes trouble soon to production. It is thought that this phenomenon is because a mixed urethane raw material forms a stagnation layer, carries out sequential gelation on a solid-state wall surface and a flozen layer is grown up thickly.

[0004] It considers as the approach of easing this phenomenon, and after adding a reaction retarder in a raw material, reducing the reaction rate of a raw material intentionally or diluting and fabricating [**** / reducing the amount of catalysts of a raw material] a raw material with a solvent, there is an approach heating etc. removes a solvent etc. However, since these approaches not only stop at easing the phenomenon of the above-mentioned gelation, but lead to the fall of productivity in order that a reaction rate may fall, they are not fundamental solutions. And by the approach of diluting with a solvent, equipment is complicated, and control becomes difficult, and in order to perform impasto, two coats is needed, or when a solvent is an organic solvent further, the human damage and the environmental problem to an operator by volatilization turn into a technical problem.

[0005] On the other hand, although the thermosetting polyurethane of 2 liquid reaction type is based also on the reactivity of a raw material, heat occurs remarkably by exothermic reaction and it has the property which carries out accumulation. Since this phenomenon happens more notably [as a mixed urethane raw material forms big *****], the coating approach which forms raw material ***** like an above-mentioned knife coating machine or a roll coater becomes unsuitable.

[0006] Then, 2 liquid collision mixing spray equipment which uses a mixed urethane raw material by the approach of an above-mentioned batch type as an approach of carrying out coating to a base material continuously, without making some equipments touched is used, and the process which carries out spray coating to the base material it runs with constant speed one by one from the orientation can be considered. Moreover, the approach of easing the accretion of the above-mentioned reaction hardened material in a Provisional-Publication-No. No. 58174 [58 to] official report, and carrying out continuation coating to it by use of a special die, as an option, at stability is proposed.

[0007]

[Problem(s) to be Solved by the Invention] However, by the former approach using 2 liquid collision mixing spray equipment, Myst of a raw material disperses around and spray equipment causes environmental pollution and contamination of equipment in order to inject a mixed urethane raw material from a nozzle. For this reason, it is necessary to extend the facility from which Myst is removed or to maintain equipment frequently. Moreover, although the yield in the case of coating worsens, it is difficult to avoid scattering of Myst for the approach that a

nozzle head is brought to some extent close to a base material, very much. Furthermore, it becomes difficult to take out the smooth nature on the front face of coating as effect which it has on the product of spray coating **. This is based on the thickness nonuniformity by the difference in a spray consistency, and two reasons of imperfect leveling after a spray. Moreover, since air bubbles are generated to some extent, an appearance worsens or the coating by the spray causes a strong fall. Therefore, there are many troubles in the continuation coating approach using spray equipment.

[0008] On the other hand, by the approach indicated by the Provisional-Publication-No. No. 58174 [58 to] official report, although the continuation coating which surely was stabilized can be held to some extent, since hardening by stagnation of the polyurethane raw material in an above-mentioned wall surface advances steadily, it always needs to adjust a die lip into coating. Since it is difficult to control hardening on a wall surface if it becomes the continuation coating for several days from several hours, it is still necessary to take the approach of preparing two or more dies and exchanging them. Furthermore, since the structure in a die is complicated, it requires time and effort for washing.

[0009] The purpose of this invention is to provide a base material with the approach and equipment which manufacture a polyurethane sheet to stability continuously over long duration by carrying out coating of the thermosetting polyurethane raw material of 2 liquid reaction type to long duration stability continuously.

[0010]

[Means for Solving the Problem] In order to attain the above-mentioned purpose the 1st mode of the manufacture approach of the polyurethane sheet of this invention By carrying out coating of the thermosetting mixed polyurethane raw material of 2 liquid reaction type to one side of a base material continuously, and carrying out heat hardening of said thermosetting polyurethane raw material to it In the manufacture approach of a polyurethane sheet of manufacturing the polyurethane sheet which has a polyurethane layer on one side of a base material Between the conveyance objects open said base material which runs said raw material with constant speed, said base material, and spacing, and meet, and it runs at an equal rate, discharge, The process which forms a coating layer with uniform thickness by pressing said raw material with the roller of a pair at least through said base material and said conveyance object, It has the process which heats and stiffens said coating layer currently pinched by said base material and said conveyance object, and the process which processes to the laminated material obtained when said coating layer hardened.

[0011] According to the above-mentioned invention, the mixed thermosetting polyurethane raw material of 2 liquid reaction type is breathed out between a base material and a conveyance object, and while the coating layer of uniform thickness is formed in the condition of having been inserted into the base material and the conveyance object, heat hardening of this coating layer is carried out. Therefore, neither the device for forming a coating layer nor the device for heating a coating layer touches directly, the coating layer, i.e., the thermosetting polyurethane raw material, before hardening. Consequently, even

if it manufactures a polyurethane sheet over long duration, the frozen layer accompanying advance of gelation of a raw material does not fix in those devices. Moreover, at the process which forms a coating layer, since a raw material is pressed with the roller of a pair at least, the air bubbles which existed in the raw material are extruded and removed by the roller.

[0012] The 2nd mode of the manufacture approach of the polyurethane sheet of this invention By carrying out coating of the thermosetting mixed polyurethane raw material of 2 liquid reaction type to both sides of a base material continuously, and carrying out heat hardening of said thermosetting polyurethane raw material to them In the manufacture approach of a polyurethane sheet of manufacturing the polyurethane sheet which has a polyurethane layer to both sides of a base material The process which carries out the regurgitation of said raw material to the top face of the 1st conveyance object it runs with constant speed, It supplies so that said 1st conveyance object may be met and it may run said base material at a rate equal to said 1st conveyance object from the upper part of said 1st conveyance object with which said raw material was breathed out. The process which forms the 1st coating layer with uniform thickness by pressing said raw material with the roller of a pair at least through said the 1st conveyance object and said base material, The process which carries out the regurgitation of said raw material to the top face of said base material which forms said 1st coating layer between said 1st conveyance object further, Supply so that said base material may be met and it may run the 2nd conveyance object at a rate equal to said base material from the upper part of said base material with which said raw material was breathed out by the top face, and said base material and the 2nd conveyance object are minded. The process which forms the 2nd coating layer with uniform thickness by pressing at least the raw material supplied to the top face of said base material with the roller of a pair, The process which heats and stiffens the 1st [said] coating layer currently pinched by said the 1st conveyance object and said base material and said 2nd coating layer currently pinched by said base material and said 2nd conveyance object, It has the process which processes to the laminated material obtained when either [at least] said 1st coating layer or said 2nd coating layer hardened.

[0013] Although the above-mentioned invention manufactures the polyurethane sheet which made the polyurethane layer unite with both sides of a base material The mixed thermosetting polyurethane raw material of 2 liquid reaction type It is breathed out between base material one field and the 1st conveyance object and between the field of another side of a base material, and the 2nd conveyance object, and while the 1st of uniform thickness and the 2nd coating layer are formed in the condition of having been inserted among them, heat hardening of these coating layer is carried out. Therefore, like the 1st mode of the manufacture approach of the polyurethane sheet of this invention, even if it manufactures a polyurethane sheet over long duration, the frozen layer accompanying advance of gelation of a raw material does not fix in the device for heating the device and coating layer for forming a coating layer etc. And since the raw material is pressed using the roller of a pair at least for formation of a coating layer, the air bubbles in a raw material are also removed.

[0014] In the manufacture approach of the polyurethane sheet of this invention, as long as a thermosetting polyurethane raw material can sandwich a thermosetting polyurethane raw material with a base material and a conveyance object, it may be breathed out on a base material and may be breathed out on a conveyance object. Moreover, in order to open a thermosetting polyurethane raw material crosswise [of a base material], the regurgitation of a thermosetting polyurethane raw material may go making the both-way migration of the nozzle which carries out the regurgitation of the thermosetting polyurethane raw material carry out crosswise [of a base material], makes the member by which a thermosetting polyurethane raw material is breathed out incline downward toward the transit direction lower stream of a river, and may go. On a base material or a conveyance object, in order to prevent the ununiformity of the thickness of the coating layer by generating of a wrinkling, it is desirable to give tension in the transit direction of a base material or a conveyance object.

[0015] Moreover, as processing of the polyurethane sheet after a thermosetting polyurethane raw material hardens, you may roll round in the shape of a roll, and may cut to fixed die length. In rolling round a polyurethane sheet in the shape of a roll, an exfoliation sheet exfoliates, before rolling round. When cutting a polyurethane sheet, it does not exfoliate but an exfoliation sheet can be used as a protection sheet.

[0016] The 1st mode of the polyurethane sheet manufacturing installation of this invention Between the base material it runs with constant speed, and the conveyance object which ends and meets and runs this base material and spacing at a rate equal to said base material By pressing at least the raw material breathed out from the urethane raw material impregnation means which carries out the regurgitation of the thermosetting mixed polyurethane raw material of 2 liquid reaction type, and said urethane raw material impregnation means with the roller of a pair through said base material and said conveyance object It has a coating means to form the coating layer of uniform thickness, a heating means to heat and stiffen said coating layer in the condition of being pinched by said base material and said conveyance object, and a processing means to process to the laminated material obtained when said coating layer hardened.

[0017] The 2nd mode of the polyurethane sheet manufacturing installation of this invention The 1st urethane raw material impregnation means which carries out the regurgitation of the thermosetting polyurethane raw material of 2 liquid reaction type mixed on the top face of the 1st conveyance object it runs with constant speed, From the upper part of said 1st conveyance object, supply said base material so that said 1st conveyance object may be met and it may run at an equal rate, and said the 1st conveyance object and said base material are minded. The 1st coating means which forms the 1st coating layer of uniform thickness by pressing at least the raw material breathed out from said 1st urethane raw material impregnation means with the roller of a pair, The 2nd urethane raw material impregnation means which carries out the regurgitation of the 2 liquid reaction type thermosetting polyurethane raw material mixed on the top face of said base material which holds said 1st coating layer between said

1st conveyance object, From the upper part of said base material which holds said 1st coating layer between said 1st conveyance object, supply the 2nd conveyance object so that said base material may be met and it may run at an equal rate, and said base material and said 2nd conveyance object are minded at least. The 2nd coating means which forms the 2nd coating layer of uniform thickness by pressing at least the raw material breathed out from said 2nd urethane raw material impregnation means with the roller of a pair, While heating and stiffening said 1st coating layer in the condition of being pinched by said the 1st conveyance object and said base material It has a processing means to process to the laminated material obtained when either [at least] a heating means to heat and stiffen said 2nd coating layer in the condition of being pinched by said base material and said 2nd conveyance object, said 1st coating layer or said 2nd coating layer hardened.

[0018] According to the polyurethane sheet manufacturing installation of this invention, a coating means pinches the raw material breathed out from the urethane raw material impregnation means through a base material and a conveyance object, and forms a coating layer, and further, since a heating means carries out heat hardening of the coating layer after having been pinched by the base material and the conveyance object, the raw material before hardening does not contact these coating means and a heating means.

Consequently, even if it manufactures a polyurethane sheet over long duration, the frozen layer accompanying advance of gelation of a raw material fixes neither for these coating means nor a heating means. Moreover, since the coating means has composition which presses a raw material with the roller of a pair at least, the air bubbles in a raw material are removed by the press with this roller.

[0019] In addition, in this specification, the "upstream" and a "lower stream of a river" mean the upstream and the lower stream of a river to the migration direction of the base material at the time of carrying out coating of the thermosetting polyurethane, or a sheet.

[0020]

[Embodiment of the Invention] Next, the operation gestalt of this invention is explained with reference to a drawing.

[0021] (1st operation gestalt) Drawing 1 is the outline block diagram of the polyurethane sheet manufacturing installation by the 1st operation gestalt of this invention.

[0022] The equipment shown in drawing 1 carries out coating of the thermosetting polyurethane raw material of 2 liquid reaction type to one side of a base material 1. The coating field which carries out coating of the thermosetting polyurethane raw material which produces a long polyurethane sheet continuously and was mixed by stiffening this so that it may be in the condition of having been inserted by the base material 1 and the exfoliation sheet 2, It is divided roughly into the hardening field which promotes reaction hardening, and the cooling rolling-up field which cools the hardened thermosetting polyurethane raw material to ordinary temperature, and is rolled round on a roll by heating the thermosetting polyurethane raw material by which coating was carried out.

[0023] The base material 1 is wound around the base material feed roller 4 in the

state of the roll. In a coating field, the base material 1 which it let out from the base material feed roller 4 turns up the field where coating of the thermosetting polyurethane raw material is carried out, and is conveyed horizontally.

[0024] The exfoliation sheet 2 as well as a base material 1 is wound around the exfoliation sheet feed roller 5 in the state of the roll. In a coating field, the exfoliation sheet 2 which it let out from the exfoliation sheet feed roller 5 opens a base material 1 and predetermined spacing, meets a base material 1, and is conveyed at the same rate in the same direction as a base material 1.

[0025] In the coating field, the urethane mixing injector which mixes the thermosetting polyurethane raw material of 2 liquid reaction type, and carries out the regurgitation to the top face of a base material 1 is arranged above the base material 1. Generally the urethane mixing injector equipped with the chamber to stir as an urethane mixing injector can be used.

[0026] As a fundamental facility with which this urethane mixing injector is equipped, there are the pump and hose which convey a raw material to a mixing head 3, and washing Rhine for washing a mixing head 3 from the tank which stores 2 liquid, respectively, the mixing head 3 equipped with nozzle 3a which carries out the regurgitation of the thermosetting mixed urethane raw material, and a tank. Moreover, although the equipment which stirs the inside of a tank, the equipment which carries out temperature control, the pressure adjuster in a tank, etc. can be illustrated as an option, it is not restricted to these. As engine performance required for the above-mentioned urethane mixing injector at least, it is stirring mixing of 2 liquid being ensured, discharge quantity's being stabilized, and being able to perform the regurgitation by which the discharge pressure's was stabilized on the long duration continuation target in mixing-head 3a, and about discharge quantity, **2 or less % of the weight is desirable as mixed liquor, and **1.5 or less % of the weight is still more desirable.

[0027] the direction in which the cross direction of a base material 1, i.e., the conveyance direction of a base material 1, and a mixing head 3 cross at right angles by head guide 3b -- a round trip -- it is supported movable. The regurgitation of the thermosetting urethane raw material can be carried out by predetermined width of face by carrying out the regurgitation of the thermosetting polyurethane raw material from nozzle 3a, making the both-way migration of the mixing head 3 carry out crosswise [of a base material 1] at the rate of predetermined with a non-illustrated drive.

[0028] The coating rollers 6a and 6b of a pair are arranged at the downstream of a mixing head 3. It opens in between, the coating rollers 6a and 6b counter spacing in the vertical direction, and the base material 1 is formed. Spacing of the coating rollers 6a and 6b is set up according to the coating thickness of a thermosetting polyurethane raw material, after taking into consideration the thickness of the base material 1 inserted into the coating rollers 6a and 6b, and the exfoliation sheet 2. Support **** rotation of the downward coating roller 6b is carried out in a base material 1 from the lower part of a base material 1. Upper coating roller 6a sticks the exfoliation sheet 2 to a part of peripheral surface, and rotates so that it may be conveyed in parallel with a base material 1, after supplying the exfoliation sheet 2 which it let out from the exfoliation sheet feed

roller 5 from the upper part of a base material 1.

[0029] The coating rollers 6a and 6b are arranged as mentioned above, and a thermosetting polyurethane raw material is breathed out between a base material 1 and the exfoliation sheet 2 by supplying the exfoliation sheet 2 through upper coating roller 6a. And rather than the part where both spacing of the coating rollers 6a and 6b serves as min, on a base material 1, a thermosetting polyurethane raw material collects, it comes out, and a certain resin bank 7 is formed in the upstream. With rotation of the coating rollers 6a and 6b, the thermosetting polyurethane raw material which formed the resin bank 7 and was breathed out on the base material 1 by the above configuration is pressed by the coating rollers 6a and 6b through a base material 1 and the exfoliation sheet 2, and coating is carried out by predetermined thickness between a base material 1 and the exfoliation sheet 2.

[0030] The resin bank 7 is important in order to make it the coating thickness of a thermosetting polyurethane raw material not become thinner than desired thickness. However, since the thermosetting polyurethane raw material breathed out on the base material 1 spreads on the front face of a base material 1 under the effect of gravity, the resin bank 7 will disappear with the passage of time. So, with this operation gestalt, the mixing head 3 is moved at the rate at which the resin bank 7 does not disappear in the whole region of the successive range.

[0031] On the other hand, at the both ends of the successive range of a mixing head 3, if the passing speed of a mixing head 3 is too quick, although the resin bank 7 is formed, in the center section, the phenomenon in which it is no longer formed hardly will occur. Although this surely stops a mixing head 3 at the both ends of the successive range of a mixing head 3 for the change of the migration direction, it is because a thermosetting polyurethane raw material is incorporated between coating roll 6a and 6b before the discharge quantity of the thermosetting polyurethane raw material per unit length decreases and the resin bank 7 is formed in the pars intermedia of a successive range, so that the passing speed of a mixing head 3 becomes large.

[0032] Therefore, it is important to move a mixing head 3 at the rate at which the resin bank 7 in which the resin bank 7 was certainly formed in and was moreover formed also in the center section of the successive range of a mixing head 3 does not disappear throughout the successive range of a mixing head 3, in order to carry out coating of the thermosetting polyurethane raw material by uniform thickness. In order to satisfy such conditions, specifically, it is desirable to move a mixing head 3 at the rate of 5 or more m/min and 100 m/min or less.

[0033] The nip roller 8 of the pair which presses further the thermosetting polyurethane raw material made into predetermined thickness with the coating rolls 6a and 6b is arranged about the conveyance direction of a base material 1 at the downstream of the coating rolls 6a and 6b.

[0034] In a hardening field, a thermosetting polyurethane raw material is heated with two heating furnaces, the auxiliary heating furnace 9 and the hardening heating furnace 10. The auxiliary heating furnace 9 heats a thermosetting polyurethane raw material preparatorily in order to stiffen the thermosetting polyurethane raw material in the hardening heating furnace 10 more efficiently,

and it is arranged at the downstream of a nip roller 8. The hardening heating furnace 10 is arranged at the downstream of the auxiliary heating furnace 9. A thermosetting polyurethane raw material fully hardens the exfoliation sheet 2 to extent which can exfoliate from a thermosetting polyurethane raw material by passing the hardening heating furnace 10, where a thermosetting polyurethane raw material is inserted into a base material 1 and the exfoliation sheet 2.

[0035] The exfoliation sheet winder 13 which exfoliates and rolls round the thermosetting polyurethane raw material hardened in the hardening field by the cooling rolling-up field to the exfoliation sheet 2 in the shape of a roll, The cooling roller group 12 which cools the polyurethane sheet 15 which was obtained because the exfoliation sheet 2 exfoliates by the exfoliation sheet winder 13, and with which the laminating of the thermosetting polyurethane was carried out to one side of a base material 1 to ordinary temperature, The polyurethane sheet winder 14 which rolls round the polyurethane sheet 15 cooled by the cooling roller group 12 in the shape of a roll is arranged.

[0036] Next, the coating procedure of the thermosetting polyurethane to one side of a base material 1 by thermosetting above-mentioned polyurethane coating equipment is explained.

[0037] First, the regurgitation of the thermosetting polyurethane raw material is carried out from nozzle 3a of a mixing head 3 on the base material 1 it runs with constant speed, letting out a base material 1 and the exfoliation sheet 2 from the base material feed roller 4 and the exfoliation sheet feed roller 5, respectively. Under the present circumstances, both-way migration of the mixing head 3 is carried out crosswise [of a base material 1], and the resin bank 7 is also formed over the successive range whole region of a mixing head 3. And with transit of a base material 1, the breathed-out thermosetting polyurethane raw material passes through between the coating rolls 6a and 6b of a pair, and, thereby, let a thermosetting polyurethane raw material be uniform thickness.

[0038] Here, as mentioned above, since a thermosetting polyurethane raw material is breathed out between a base material 1 and the exfoliation sheet 2, it is conveyed in the condition of having been inserted into the base material 1 and the exfoliation sheet 2. Thereby, coating of the thermosetting polyurethane raw material can be continuously carried out to the top face of a base material 1, without making a thermosetting polyurethane raw material adhere to the coating rollers 6a and 6b.

[0039] The thermosetting polyurethane raw material conveyed being inserted into a base material 1 and the exfoliation sheet 2 passes through between the nip rollers 8 of a pair. Thereby, a thermosetting polyurethane raw material is further pressed by the nip roller 8, and degassing is performed. In this process, since a thermosetting polyurethane raw material is in the condition pinched by the base material 1 and the exfoliation sheet 2, a thermosetting polyurethane raw material does not adhere to a nip roller 8.

[0040] After having been pinched by the base material 1 and the exfoliation sheet 2, and the thermosetting polyurethane raw material in which degassing was performed with the nip roller 8 is preparatorily heated with the auxiliary heating furnace 9, it is conveyed by conveyor 10a and passes the hardening heating

furnace 10. By passing the hardening heating furnace 10, a thermosetting polyurethane raw material is hardened and is united with a base material 1. Whenever [by the hardening heating furnace 10 / stoving temperature], and heating time are suitably set up according to the class of thermosetting polyurethane raw material, coating thickness, coating width of face, etc. so that extent which can exfoliate the exfoliation sheet 2 can be made to fully harden a thermosetting polyurethane raw material.

[0041] The base material 1 which passed the hardening heating furnace 10 and the thermosetting polyurethane raw material hardened is transported to a cooling rolling-up field next. In a cooling rolling-up field, the exfoliation sheet 2 exfoliates from the hardened thermosetting polyurethane raw material first. The exfoliative exfoliation sheet 2 is rolled round by the exfoliation sheet winder 13. When the exfoliation sheet 2 exfoliates from the hardened thermosetting polyurethane raw material on the other hand, the polyurethane sheet 15 of the structure where the laminating of the polyurethane layer was carried out to one side of a base material 1 is obtained. However, since this polyurethane sheet 15 is still in a condition hot only by having come out of the hardening heating furnace 10, heat is removed via the cooling roller group 12. Finally the polyurethane sheet with which heat was removed is rolled round by the polyurethane sheet winder 14.

[0042] As explained above, according to this operation gestalt, the polyurethane sheet 15 which has a polyurethane layer on one side of a base material 1 is obtained, but since the polyurethane layer before hardening has the composition of contacting directly no components which are surely inserted between a base material 1 and the exfoliation sheet 2, are conveyed, and constitute coating equipment, it can prevent certainly that a thermosetting polyurethane raw material adheres to these components. Consequently, since it becomes without the frozen layer accompanying advance of gelation of a thermosetting urethane raw material fixing on the components of coating equipment, it is stabilized over a long time and coating of the thermosetting urethane raw material can be carried out continuously, as a result it is stabilized over a long time and the polyurethane sheet 15 can be produced continuously.

[0043] Here, the effectiveness of a nip roller 8 is stated to a detail.

[0044] Usually, if the base material 1 and the exfoliation sheet 2 are smooth, in case coating will be carried out with the coating rollers 6a and 6b, air bubbles are hardly generated in a thermosetting polyurethane raw material. However, although it is small, since air bubbles arise, when the exfoliation sheet 2 is not smooth, and sticking the exfoliation sheet 2 on the resin bank 7, air bubbles are generated and it becomes that it is easy to be involved in coating roll 6a.

Moreover, even if a base material 1 and the exfoliation sheet 2 are smooth, air bubbles may be generated at the time of the regurgitation of a thermosetting polyurethane raw material, or air bubbles may exist in a raw material. Thus, the air bubbles incorporated in the thermosetting polyurethane raw material exist as air bubbles in the polyurethane layer of the obtained polyurethane sheet 15, or shift to a front face, and serve as a crater. When becoming a crater, it becomes the cause which worsens the appearance of the polyurethane sheet 15. Although it is unrelated to an appearance even if it is the case where it exists as air

bubbles, there is a possibility of leading to the fall of the physical properties of a polyurethane layer.

[0045] Therefore, it is necessary to remove such air bubbles as much as possible. Then, the air bubbles incorporated in the thermosetting polyurethane raw material can be missed at the crosswise edge of a base material 1 by pressing further the thermosetting polyurethane raw material by which narrowed spacing of a nip roller 8 and coating was carried out on the base material 1 rather than spacing of the coating rollers 6a and 6b with a nip roller 8. Moreover, coating precision with the coating rollers 6a and 6b can be further raised by pressing a thermosetting polyurethane raw material further with a nip roller 8. Although spacing of the nip roller 8 in this case changes somewhat with the viscosity and the cure rates of a thermosetting polyurethane raw material, it is desirable to spacing of the coating rollers 6a and 6b, and is still more desirable. [90 - 99% of] [85 - 99.5% of]

[0046] Since the coating rollers 6a and 6b as well as a nip roller 8 rotate it, pressurizing a thermosetting polyurethane raw material although a nip roller 8 has effectiveness in degassing of the thermosetting polyurethane raw material before hardening, and improvement in coating precision as stated above, the same effectiveness as a nip roller 8 is expectable. Therefore, when effectiveness sufficient by just the press with the coating rollers 6a and 6b is acquired, it is not necessary to necessarily form a nip roller 8.

[0047] Although the example using two heating furnaces, the auxiliary heating furnace 9 and the hardening heating furnace 10, was shown with this operation gestalt in order to promote reaction hardening of a thermosetting polyurethane raw material, about the installation location and number, it can be set as arbitration according to the engine performance of a heating furnace etc. Also as heating apparatus, not only a heating furnace but a heating table can also be used, and especially the gestalt or heating method of heating apparatus are not restricted.

[0048] Moreover, although the example which exfoliates the exfoliation sheet 2 was shown with this operation gestalt after the base material 1 passed the hardening heating furnace 10 and the thermosetting polyurethane raw material hardened, specifically, this "hardening" means the condition that the viscosity of the thermosetting polyurethane raw material after 2 liquid mixing became more than 100 pascal second (Pa-s). Therefore, if this condition is fulfilled, before the base material 1 with which coating of the thermosetting polyurethane raw material was carried out will be supplied to the hardening heating furnace 10, you may exfoliate the exfoliation sheet 2 from a thermosetting polyurethane raw material.

[0049] Furthermore, although this operation gestalt showed the example which rolls round the obtained polyurethane sheet 15 by the polyurethane sheet winder 14, it may replace with the polyurethane sheet winder 14 depending on the purpose of using the polyurethane sheet 15, the cutter which cuts the polyurethane sheet 15 crosswise may be installed, and the polyurethane sheet 15 may be cut to fixed die length. When rolling round the polyurethane sheet 15, since the exfoliation sheet 2 shifts gradually according to the perimeter difference

of the polyurethane sheet 15 and the exfoliation sheet 2, the polyurethane sheet 15 cannot be rolled round, without exfoliating the exfoliation sheet 2, but when cutting without rolling round the polyurethane sheet 15, it is the purpose which protects the front face of a polyurethane layer, and it does not exfoliate but the exfoliation sheet 2 may be cut with the exfoliation sheet 2.

[0050] (2nd operation gestalt) Drawing 2 is the outline block diagram of the polyurethane sheet manufacturing installation by the 2nd operation gestalt of this invention.

[0051] The equipment shown in drawing 2 produces a long polyurethane sheet continuously by carrying out coating of the thermosetting polyurethane raw material of 2 liquid reaction type to both sides of a base material 21, and making them harden this.

[0052] Thus, since the equipment of this operation gestalt carries out coating of the thermosetting polyurethane raw material to both sides of a base material 21, corresponding to it, the exfoliation sheets 22a and 22b of two sheets are used for it. Therefore, as a feeder style of a sheet, it is in the conveyance condition in the coating field and the hardening field in which a base material 21 is conveyed horizontally, and it has 1st exfoliation sheet feed-roller 25a around which exfoliation sheet 22a located in the bottom is twisted, the base material feed roller 24 around which the base material 21 located in the middle is twisted, and 2nd exfoliation sheet feed-roller 25b around which exfoliation sheet 22b located most in the bottom is twisted. Exfoliation sheet 22a is supplied first, subsequently, a base material 21 is supplied to a coating field from the upper part of exfoliation sheet 22a, and, finally exfoliation sheet 22b is supplied to it from the upper part of a base material 21. The travel speed of the base material 21 and each exfoliation sheets 22a and 22b in a coating field is set up so that it may become equal mutually.

[0053] Moreover, with this operation gestalt, it has the 1st urethane mixing injector for carrying out coating of the thermosetting polyurethane raw material to the rear-face side of a base material 21, and the 2nd urethane mixing injector for carrying out coating of the thermosetting polyurethane raw material to the front-face side of a base material 21 corresponding to carrying out coating of the thermosetting polyurethane raw material to both sides of a base material 21. the direction which each urethane mixing injector is equipped with the nozzles 23a and 43a which carry out the regurgitation of the thermosetting urethane raw material like the 1st operation gestalt, respectively, and intersects perpendicularly with the cross direction of a base material 21 with the head guides 23a and 43a - a round trip -- it has the mixing heads 23 and 43 supported movable. Each mixing heads 23 and 43 keep their distance in the conveyance direction of exfoliation sheet 22a in a coating field, and are arranged in it.

[0054] Furthermore, with the equipment shown in drawing 2, in order to consider as the thickness of a request of the thermosetting polyurethane raw material breathed out from Nozzles 23a and 43a, it has the 1st respectively same coating roller 26a and 26b and 2nd respectively same coating roller 46a and 46b as the 1st operation gestalt.

[0055] The 1st coating roller 26a and 26b opens spacing in the field between two

mixing heads 23 and 43 for exfoliation sheet 22a in the vertical direction in between, and opposite arrangement is carried out. A base material 21 is supplied above exfoliation sheet 22a via 1st coating roller 26a located up. Therefore, nozzle 23a located in the upstream will carry out the regurgitation of the thermosetting polyurethane raw material between exfoliation sheet 22a and a base material 21.

[0056] The 2nd coating roller 46a and 46b is arranged like the 1st coating roller 26a and 26b rather than another nozzle 43a at the downstream. Exfoliation sheet 22b is supplied above a base material 21 via 2nd coating roller 46a located up. Therefore, nozzle 43a located in the downstream will carry out the regurgitation of the thermosetting polyurethane raw material between a base material 21 and exfoliation sheet 22b.

[0057] Here between the 2nd coating roller 46a and 46b Since exfoliation sheet 22a passes after coating of the thermosetting polyurethane raw material was carried out to the top face and the base material 21 has stuck to the top face further, spacing of the 2nd coating roller 46a and 46b It is large rather than spacing of the 1st coating roller 26a and 26b by the thickness of the coating thickness of the thermosetting polyurethane raw material by the mixing head 43, and exfoliation sheet 22b.

[0058] In addition, although drawing 2 does not show, the respectively same nip roller as the 1st operation gestalt is arranged at the downstream of the 1st coating roller 26a and 26b and the 2nd coating roller 46a and 46b.

[0059] Although the above is a configuration in the coating field of the equipment by this operation gestalt, the configuration in the hardening field and cooling rolling-up field after it is the same as that of the 1st operation gestalt except for the point that exfoliation sheet winder 33a for rolling round lower exfoliation sheet 22a was added.

[0060] That is, in the hardening field, two heating furnaces, the auxiliary heating furnace 29 and the hardening heating furnace 30, are installed. Moreover, the exfoliation sheet winder 33 b which exfoliates and rolls round upper exfoliation sheet 22b in the shape of a roll in a cooling rolling-up field, the exfoliation sheet winder 33 a which exfoliates and roll round lower exfoliation sheet 22a in the shape of a roll, the cooling roller group 32 which cool the polyurethane sheet obtained because the exfoliation sheets 22a and 22b exfoliate to ordinary temperature, and the polyurethane sheet winder 34 which roll round in the shape of a roll in the cooled polyurethane sheet are installed.

[0061] Next, the coating procedure of the thermosetting polyurethane to both sides of a base material 21 by the equipment shown in drawing 2 is explained.

[0062] First, it lets out from exfoliation sheet feed roller 25a, and the regurgitation of the thermosetting polyurethane raw material is carried out from nozzle 23a of the mixing head 23 of the upstream on exfoliation sheet 22a currently conveyed horizontally. While a mixing head 23 forms a resin bank on exfoliation sheet 22a at this time, both-way migration is carried out crosswise [of exfoliation sheet 22a]. It passes through between the 1st coating roller 26a and 26b, the thermosetting polyurethane raw material breathed out on exfoliation sheet 22a being inserted into exfoliation sheet 22a and a base material 21, and, thereby, let it be uniform

thickness. A thermosetting polyurethane raw material can carry out coating of the thermosetting polyurethane raw material to the rear face of a base material 21 continuously, without making a thermosetting polyurethane raw material adhere to the 1st coating roller 26a and 26b, since it is breathed out between exfoliation sheet 22a and a base material 21.

[0063] The thermosetting polyurethane raw material breathed out on exfoliation sheet 22a passes a nip roller in the condition of having been inserted into exfoliation sheet 22a and a base material 21, and, thereby, degassing of a thermosetting polyurethane raw material is performed. In addition, when just the 1st coating roller 26a and 26b is enough as degassing and coating precision of a thermosetting polyurethane raw material, this nip roller is unnecessary.

[0064] The regurgitation of the thermosetting polyurethane raw material is carried out on a base material 21 from nozzle 43a of the mixing head 43 of the downstream after degassing of the thermosetting polyurethane raw material by which coating was carried out to the rear face of a base material 21. While a mixing head 43 forms a resin bank on a base material 21 at this time, both-way migration is carried out crosswise [of a base material 21]. It passes through between the 2nd coating roller 46a and 46b, the thermosetting polyurethane raw material breathed out on the base material 21 being inserted into a base material 21 and exfoliation sheet 22b, and, thereby, let it be uniform thickness. The thermosetting polyurethane raw material breathed out from nozzle 43a of the mixing head 43 of the downstream can carry out coating of the thermosetting polyurethane raw material to the front face of a base material 21 continuously, without making a thermosetting polyurethane raw material adhere to the 2nd coating roller 46a and 46b, since it is breathed out between a base material 21 and exfoliation sheet 22b.

[0065] The thermosetting polyurethane raw material breathed out on the base material 21 passes the nip roller of the downstream in the condition of having been inserted into a base material 21 and exfoliation sheet 22b, and, thereby, degassing of a thermosetting polyurethane raw material is performed. In addition, when just the 2nd coating roller 46a and 46b is enough as degassing and coating precision of a thermosetting polyurethane raw material, this nip roller is unnecessary.

[0066] Coating of the thermosetting polyurethane raw material is carried out to both sides of a base material 21 by the above, and the web which the exfoliation sheets 22a and 22b stuck to the vertical side further is obtained.

[0067] The obtained web passes the auxiliary heating furnace 29 and the hardening heating furnace 30 like the 1st operation gestalt, and by this, the thermosetting polyurethane raw material by which coating was carried out to both sides of a base material 21 is hardened, and is united with a base material 21. Then, the exfoliation sheets 22a and 22b exfoliate from a web. The exfoliation sheets 22a and 22b which exfoliated from the web are rolled round by the exfoliation sheet winders 33a and 33b in the shape of a roll, respectively. On the other hand, the polyurethane sheet of the structure where the laminating of the polyurethane layer was carried out to both sides of a base material 21 is obtained by exfoliating the exfoliation sheets 22a and 22b from a web. Heat is removed via

the cooling roller group 32, and a polyurethane sheet is rolled round by the polyurethane sheet winder 34 in the shape of a roll.

[0068] Although the polyurethane sheet which has a two-layer polyurethane layer is obtained with this operation gestalt as explained above, the polyurethane layer before hardening is conveyed in the condition of having been inserted between a base material 21 and the exfoliation sheets 22a and 22b, and has the composition of contacting directly no components which constitute coating equipment. Therefore, also with this operation gestalt, it is stabilized over a long time as well as the 1st operation gestalt, and coating of the thermosetting polyurethane raw material can be carried out continuously.

[0069] As mentioned above, although the coating equipment shown in drawing 2 was mentioned as the example and the 2nd operation gestalt of this invention was explained, if the thermosetting polyurethane raw material of both sides of a base material 21 can be stiffened with this operation gestalt as well as the 1st operation gestalt, the gestalt or heating method of heating apparatus will not be restricted. Especially, with this operation gestalt, since coating of the thermosetting two-layer polyurethane raw material is carried out, each class can also be heated according to an individual. Before installing heating apparatus suitably between the 1st coating roller 26a and 26b and the 2nd coating roller 46a and 46b and carrying out coating of the thermosetting polyurethane raw material to the front face of a base material 21 as an approach of heating each class according to an individual, for example, the method of making the rear face of a base material 21 heat and harden the thermosetting polyurethane raw material by which coating was carried out is mentioned.

[0070] About the timing which exfoliates the exfoliation sheets 22a and 22b as well as the 1st operation gestalt, if it is in the condition that the viscosity of a thermosetting polyurethane raw material becomes 100 pascal seconds or more, it will not matter even if it exfoliates the exfoliation sheets 22a and 22b to which timing. Therefore, when it is not necessary to exfoliate in coincidence, and heat hardening of the thermosetting polyurethane raw material of both sides of a base material 21 is carried out at a separate process as mentioned above and one thermosetting polyurethane raw material hardens both exfoliation sheets 22a and 22b, you may exfoliate the exfoliation sheet by the side of the hardened polyurethane raw material irrespective of the condition of the thermosetting polyurethane raw material of another side.

[0071] Moreover, a polyurethane sheet is cut like the 1st operation gestalt, without exfoliating the exfoliation sheets 22a and 22b, and it is good also considering the exfoliation sheets 22a and 22b as a protection sheet. In this case, it may leave the both sides of the double-sided exfoliation sheets 22a and 22b, and you may exfoliate either.

[0072] Furthermore, although the coating equipment shown in drawing 2 forms a polyurethane layer in both sides of a base material 21 On the device relevant to the coating of the thermosetting polyurethane raw material from the configuration shown in drawing 2 R> 2 to the top face of a base material 21, and a concrete target The polyurethane sheet with which the polyurethane layer was formed only in the rear face of a base material 21 can also be manufactured by removing a

mixing head 43, the 2nd coating roller 46a and 46b, and exfoliation sheet winder 33b. Actuation of each device in this case is the same as the actuation mentioned above, except that actuation of the removed device is lost.

[0073] In the above, although two typical operation gestalten were mentioned as the example and explained about this invention, the thermosetting polyurethane and each device of 2 liquid reaction type which it is used for this invention are described here.

[0074] The thermosetting polyurethane of 2 liquid reaction type used for this invention is a macromolecule generated at the reaction of a compound with isocyanate radicals, such as tolylene diisocyanate and diphenylmethane diisocyanate, and polyols, such as propylene glycol and a polyethylene glycol, it is resin of the reaction hardening mold hardened from a liquid raw material to a solid-state by crosslinking reaction, and well-known cross linking agents, such as for example, 3 and 3 'dichloro 4 and 4' diamino diphenylmethane, can be used as a cross linking agent, and a well-known catalyst can be used. In the above-mentioned resin, time amount (henceforth pot life) until it carries out coating to one side or both sides of a base material continuously and the viscosity after 2 liquid mixing arrives at them in 25 degrees C at 100 pascal seconds as a reaction cure rate desirable to the manufacture approach which carries out hardening unification is 0.1 - 10 minutes, and 0.5 - 5 minutes is still more desirable.

Moreover, in the above-mentioned resin, viscosity desirable to the manufacture approach of this invention is 0.1-5 pascal seconds as viscosity of 2 liquid raw materials before mixing, and its 0.2-2 pascal seconds are still more desirable.

[0075] The base material used for this invention is flexible, and although it will not be limited especially if the taking over tension at the time of continuation coating can be borne, it is desirable that it is watertight as a thing applicable to this invention. That is, there is a possibility that in the case of a nonwoven fabric etc. a polyurethane raw material may permeate a base material, and a base material may pass a base material, and may adhere to a coating roll. As a desirable base material, the paper which carried out the laminating of various high polymer films and the film, a metallic foil, a composite sheet, etc. can be illustrated, and the glass fiber strengthening compound sheet shown [especially] in JP,4-42168,B with the composite sheet can also be used preferably.

[0076] If the exfoliation sheet used as a conveyance object is a sheet which can exfoliate after a thermosetting polyurethane raw material hardens, the releasing paper which carried out the coat of films, such as ethylene which there is not and does not almost have an adhesive property with polyurethane, and a propylene, the silicone, etc. can illustrate especially constraint preferably. Moreover, the gloss of a coating object front face may be adjusted to a faying surface with the thermosetting polyurethane of an exfoliation sheet, or concavo-convex processing which can imprint an embossing pattern may be performed to it.

[0077] On them, it is desirable that tension is given in the transit direction covering full [the] until a thermosetting polyurethane raw material hardens at least on these base materials and a conveyance object. If tension is not given, a wrinkling may arise at the edge by the side of the cross direction of a base material or a conveyance object. Moreover, when the raw material itself contracts

at the time of hardening of a thermosetting polyurethane raw material, a wrinkling may arise on a base material or a conveyance object. Thus, if a thermosetting polyurethane raw material hardens after the wrinkling has arisen, the flat sheet which has uniform thickness will not be obtained. Then, the flat polyurethane sheet which has uniform thickness can be obtained by giving tension to a base material and a conveyance object so that a wrinkling may not occur on a base material and a conveyance object.

[0078] As a device in which tension is given to a base material and a conveyance object, the powder brake and tension roll which give tension between the tensile force by the side of a delivery can be used by giving a load to the shaft of a feed roller itself. As a value of the tension given to a base material and a conveyance object, it is [object / the range of about 200 to 500 N/m, and / conveyance] desirable about a base material that it is the range of about 50 to 200 N/m.

[0079] Moreover, although the operation gestalt mentioned above showed the example which used the exfoliation sheet as a conveyance object in this invention, not only this but an endless belt may be used. When an endless belt is used as a conveyance object, although it becomes indispensable to exfoliate after a polyurethane raw material hardens at least since direct coating of the polyurethane raw material is carried out, the endless belt which carried out the Teflon (trademark) coat to the front face as an endless belt which demonstrates this function can illustrate an endless belt preferably. There is especially no constraint in the quality of the material of an endless-belt base material, and the belt which sank in, a metal belt, etc. can choose resin as glass fabrics according to the purpose. Moreover, since exfoliation from the hardened thermosetting polyurethane raw material is automatically performed by the clinch of an endless belt when an endless belt is used, a hardening field must prescribe the engine performance of heating apparatus, and the die length of an endless belt so that a thermosetting polyurethane raw material may be stiffened, by the time an endless belt is turned up.

[0080] Although the quality of the material, a configuration, structure, etc. can use a commercial thing without constraint especially, as for a coating roller and a nip roller, it is desirable to choose in consideration of the smoothness on the front face of a roller, the roundness of a roller, the parallelism between rollers, etc. according to the target coating thickness precision. Moreover, it is desirable to decide the diameter of a roller, the existence of a drive, etc. in consideration of the tension and the rate at the time of the delivery of a base material or an exfoliation sheet. Furthermore, when the viscosity of a polyurethane raw material is high, it is desirable to apply press gradually using two or more sets of roller pairs. Moreover, if needed, the temperature of a roller may be adjusted or a roll may be driven synchronizing with the taking over rate of a base material.

[0081] Moreover, although the example which carries out both-way migration of the mixing head was shown with two operation gestalten mentioned above in order to carry out coating of the thermosetting polyurethane raw material by desired width of face in a coating field, there is also the approach of widening a thermosetting polyurethane raw material using gravity. That is, while a mixing head is fixed to a center section to the coating width of face of a thermosetting

polyurethane raw material, the base material or conveyance object with which coating of the thermosetting polyurethane raw material is carried out is made to incline downward to a horizontal plane toward the transit direction lower stream of a river.

[0082] A thermosetting polyurethane raw material not only being made by this to widen without moving a mixing head crosswise but the volume of a resin bank also decreases and it is hard coming to also carry out accumulation. Moreover, the effectiveness that the air bubbles generated in the resin bank prevented invading directly under a coating roller was also found out by making the base material or conveyance object with which coating of the thermosetting polyurethane raw material is carried out incline.

[0083] As for whenever [tilt-angle / of a base material or a conveyance object], it is desirable that it is [5 degree or more] 40 degrees or less. Since the effectiveness of extension of whenever [tilt-angle] of a thermosetting polyurethane raw material at less than 5 degrees is not enough, it is not desirable. Moreover, when whenever [tilt-angle] exceeds 40 degrees, the effectiveness to extension is large, but since the thermosetting polyurethane raw material which carried out coating flows and it becomes impossible to hold uniform thickness, it is not desirable.

[0084] The upper limit of coating width of face with the very effective effectiveness to extension by the coating using an inclined plane is about 200cm. however -- even if it is a case with a coating width of face of 200cm or less, so that coating width of face is wide -- widening -- ***** -- it is desirable to move a mixing head crosswise like the operation gestalt mentioned above to the coating width of face which is **, for example, exceeds 100cm, or to arrange two or more mixing heads crosswise [coating], and to perform multipoint impregnation of a thermosetting polyurethane raw material.

[0085] Although this invention offers the manufacture approach which can carry out coating of the thermosetting polyurethane raw material of 2 liquid reaction type to a base material continuously at long duration stability, without touching equipment, it can combine the well-known manufacturing technology except not being limited to these, when actually obtaining coating equipment, and the above-mentioned operation gestalt having explained in the range which does not spoil the effectiveness of this invention. For example, it is possible whole [a part of] to carry out the process which incorporates an embossing roll in order to imprint irregularity on the front face of a polyurethane layer, or enforces the manufacture approach of this invention etc.

[0086]

[Effect of the Invention] A polyurethane sheet can be stably manufactured over a long time, without a thermosetting polyurethane raw material adhering to other parts according to this invention, since formation of the coating layer which consists of a thermosetting polyurethane raw material, and heat hardening of the coating layer are performed after the thermosetting polyurethane raw material has been sandwiched by the base material and the conveyance object as explained above. Moreover, since formation of a coating layer is performed by

pressing a thermosetting polyurethane raw material with the roller of a pair at least, even if air bubbles exist in a raw material, the air bubbles are removable.

CLAIMS

[Claim(s)]

[Claim 1] By carrying out coating of the thermosetting mixed polyurethane raw material of 2 liquid reaction type to one side of a base material continuously, and carrying out heat hardening of said thermosetting polyurethane raw material to it In the manufacture approach of a polyurethane sheet of manufacturing the polyurethane sheet which has a polyurethane layer on one side of a base material Between the conveyance objects open said base material which runs said raw material with constant speed, said base material, and spacing, and meet, and it runs at an equal rate, discharge, The process which forms a coating layer with uniform thickness by pressing said raw material with the roller of a pair at least through said base material and said conveyance object, The manufacture approach of a polyurethane sheet of having the process which heats and stiffens said coating layer currently pinched by said base material and said conveyance object, and the process which processes to the laminated material obtained when said coating layer hardened.

[Claim 2] The process which forms said coating layer is the manufacture approach of a polyurethane sheet including carrying out the regurgitation of said raw material to the top face of said base material, and supplying said conveyance object on the raw material breathed out by the top face of said base material, and pinching said raw material with said base material and said conveyance object according to claim 1.

[Claim 3] The process which forms said coating layer is the manufacture approach of a polyurethane sheet including the process which carries out the regurgitation of said raw material to the top face of said conveyance object, and the process which supplies said base material on the raw material breathed out by the top face of said conveyance object, and pinches said raw material with said conveyance object and said base material according to claim 1.

[Claim 4] The process which forms said coating layer is the manufacture approach of a polyurethane sheet given in claim 1 thru/or any 1 term of 3 including making the both-way migration of the nozzle which carries out the regurgitation of said raw material carry out crosswise [of said base material].

[Claim 5] The process which forms said coating layer is the manufacture approach of a polyurethane sheet including making the member by which said raw material is breathed out by the top face incline downward in the transit direction of the according to claim 2 or 3.

[Claim 6] The manufacture approach of a polyurethane sheet given in claim 1 thru/or any 1 term of 5 which has the process which gives the tension to the transit direction to said base material and said conveyance object after breathing out said raw material at least until said coating layer hardens.

[Claim 7] The process which processes to said laminated material is the manufacture approach of a polyurethane sheet given in claim 1 thru/or any 1

term of 6 including exfoliating said conveyance object from said hardened coating layer, and rolling round the laminated material with which said conveyance object exfoliated in the shape of a roll.

[Claim 8] The manufacture approach of a polyurethane sheet according to claim 7 that the viscosity of said coating layer exfoliates said conveyance object in the condition 100 pascal seconds or more.

[Claim 9] The process which processes to said laminated material is the manufacture approach of a polyurethane sheet given in claim 1 thru/or any 1 term of 6 including not exfoliating said conveyance object but cutting said laminated material crosswise [the].

[Claim 10] By carrying out coating of the thermosetting mixed polyurethane raw material of 2 liquid reaction type to both sides of a base material continuously, and carrying out heat hardening of said thermosetting polyurethane raw material to them In the manufacture approach of a polyurethane sheet of manufacturing the polyurethane sheet which has a polyurethane layer to both sides of a base material The process which carries out the regurgitation of said raw material to the top face of the 1st conveyance object it runs with constant speed, It supplies so that said 1st conveyance object may be met and it may run said base material at a rate equal to said 1st conveyance object from the upper part of said 1st conveyance object with which said raw material was breathed out. The process which forms the 1st coating layer with uniform thickness by pressing said raw material with the roller of a pair at least through said the 1st conveyance object and said base material, The process which carries out the regurgitation of said raw material to the top face of said base material which forms said 1st coating layer between said 1st conveyance object further, Supply so that said base material may be met and it may run the 2nd conveyance object at a rate equal to said base material from the upper part of said base material with which said raw material was breathed out by the top face, and said base material and the 2nd conveyance object are minded. The process which forms the 2nd coating layer with uniform thickness by pressing at least the raw material supplied to the top face of said base material with the roller of a pair, The process which heats and stiffens the 1st [said] coating layer currently pinched by said the 1st conveyance object and said base material and said 2nd coating layer currently pinched by said base material and said 2nd conveyance object, The manufacture approach of a polyurethane sheet of having the process which processes to the laminated material obtained when either [at least] said 1st coating layer or said 2nd coating layer hardened.

[Claim 11] The process which carries out the regurgitation of said raw material to the top face of said 1st conveyance object, and the process which carries out the regurgitation of said raw material to the top face of said base material are the manufacture approach of a polyurethane sheet according to claim 10 including moving the nozzle for said 1st coating stratification which carries out the regurgitation of said raw material, respectively, and the nozzle for said 2nd coating stratification crosswise [of said base material].

[Claim 12] The process which carries out the regurgitation of said base material to the top face of the process which carries out the regurgitation of said raw

material to the top face of said 1st conveyance object, and said base material is the manufacture approach of a polyurethane sheet including making the member by which said raw material is breathed out by the top face incline downward in the transit direction according to claim 10.

[Claim 13] The manufacture approach of a polyurethane sheet given in claim 10 thru/or any 1 term of 12 which has the process which gives tension to said base material, said 1st conveyance object, and said 2nd conveyance object in the transit direction after breathing out said raw material at least until said 1st coating layer and said 2nd coating layer harden.

[Claim 14] The process which processes to said laminated material exfoliates said 1st conveyance object from the 1st [said] hardened coating layer, The manufacture approach of a polyurethane sheet given in claim 10 thru/or any 1 term of 13 which includes exfoliating said 2nd conveyance object and rolling round the laminated material with which said 1st conveyance object and said 2nd conveyance object exfoliated in the shape of a roll from the 2nd [said] hardened coating layer.

[Claim 15] The manufacture approach of a polyurethane sheet according to claim 14 that the viscosity of said 1st coating layer and said 2nd coating layer exfoliates exfoliation of said 1st conveyance object and said 2nd conveyance object in the condition 100 pascal seconds or more, respectively.

[Claim 16] The process which processes to said laminated material is the manufacture approach of a polyurethane sheet given in claim 10 thru/or any 1 term of 12 including not exfoliating in either [at least] said 1st conveyance object or said 2nd conveyance object, but cutting said laminated material crosswise [the].

[Claim 17] Between the base material it runs with constant speed, and the conveyance object which ends and meets and runs this base material and spacing at a rate equal to said base material By pressing at least the raw material breathed out from the urethane raw material impregnation means which carries out the regurgitation of the thermosetting mixed polyurethane raw material of 2 liquid reaction type, and said urethane raw material impregnation means with the roller of a pair through said base material and said conveyance object The polyurethane sheet manufacturing installation which has a coating means to form the coating layer of uniform thickness, a heating means to heat and stiffen said coating layer in the condition of being pinched by said base material and said conveyance object, and a processing means to process to the laminated material obtained when said coating layer hardened.

[Claim 18] It is the polyurethane sheet manufacturing installation according to claim 17 to which said conveyance object is supplied from the upper part of said base material, and said urethane raw material impregnation means carries out the regurgitation of said raw material to the top face of said base material.

[Claim 19] It is the polyurethane sheet manufacturing installation according to claim 17 to which said base material is supplied from the upper part of said conveyance object, and said urethane raw material impregnation means carries out the regurgitation of said raw material to the top face of said conveyance object.

[Claim 20] said urethane raw material impregnation means -- the cross direction of said base material -- a round trip -- a polyurethane sheet manufacturing installation given in claim 17 thru/or any 1 term of 19 which was established movable and which has the nozzle which carries out the regurgitation of said raw material.

[Claim 21] Said coating means is a polyurethane sheet manufacturing installation given in claim 17 thru/or any 1 term of 19 which makes it incline downward and makes it run said base material and said conveyance object.

[Claim 22] A polyurethane sheet manufacturing installation given in claim 17 thru/or any 1 term of 21 which has the device in which the tension to the transit direction is given to said base material and said conveyance object.

[Claim 23] Said processing means is a polyurethane sheet manufacturing installation given in claim 17 thru/or any 1 term of 22 which has an exfoliation means to make said conveyance object exfoliate from said hardened coating layer, and the rolling-up means which rolls round the laminated material with which said conveyance object exfoliated in the shape of a roll.

[Claim 24] Said processing means is a polyurethane sheet manufacturing installation given in claim 17 thru/or any 1 term of 22 which has a cutting means to cut said laminated material crosswise with said conveyance object.

[Claim 25] The 1st urethane raw material impregnation means which carries out the regurgitation of the thermosetting polyurethane raw material of 2 liquid reaction type mixed on the top face of the 1st conveyance object it runs with constant speed, From the upper part of said 1st conveyance object, supply said base material so that said 1st conveyance object may be met and it may run at an equal rate, and said the 1st conveyance object and said base material are minded. The 1st coating means which forms the 1st coating layer of uniform thickness by pressing at least the raw material breathed out from said 1st urethane raw material impregnation means with the roller of a pair, The 2nd urethane raw material impregnation means which carries out the regurgitation of the 2 liquid reaction type thermosetting polyurethane raw material mixed on the top face of said base material which holds said 1st coating layer between said 1st conveyance object, From the upper part of said base material which holds said 1st coating layer between said 1st conveyance object, supply the 2nd conveyance object so that said base material may be met and it may run at an equal rate, and said base material and said 2nd conveyance object are minded at least. The 2nd coating means which forms the 2nd coating layer of uniform thickness by pressing at least the raw material breathed out from said 2nd urethane raw material impregnation means with the roller of a pair, While heating and stiffening said 1st coating layer in the condition of being pinched by said the 1st conveyance object and said base material A heating means to heat and stiffen said 2nd coating layer in the condition of being pinched by said base material and said 2nd conveyance object, The polyurethane sheet manufacturing installation which has a processing means to process to the laminated material obtained when either [at least] said 1st coating layer or said 2nd coating layer hardened.

[Claim 26] said 1st urethane raw material impregnation means and said 2nd

urethane raw material impregnation means -- respectively -- the cross direction of said base material -- a round trip -- the polyurethane sheet manufacturing installation according to claim 25 which has the nozzle which was prepared movable, and which carries out the regurgitation of said raw material.

[Claim 27] It is the polyurethane sheet manufacturing installation according to claim 25 which said 1st coating means makes it incline downward, runs said base material and said 1st conveyance object, and includes that said 2nd coating means makes it incline downward, and makes it run said base material and said 2nd conveyance object.

[Claim 28] A polyurethane sheet manufacturing installation given in claim 25 thru/or any 1 term of 27 which has the device in which the tension to the transit direction is given to said base material, said 1st conveyance object, and said 2nd conveyance object.

[Claim 29] The 1st exfoliation means which makes said 1st conveyance object exfoliate from the 1st [said] coating layer which hardened said processing means, The 2nd exfoliation means which makes said 2nd conveyance object exfoliate from the 2nd [said] hardened coating layer, A polyurethane sheet manufacturing installation given in claim 25 thru/or any 1 term of 28 which has the rolling-up means which rolls round the laminated material with which said 1st conveyance object and said 2nd conveyance object exfoliated in the shape of a roll.

[Claim 30] said processing means -- said laminated material -- either [at least] said 1st conveyance object or said 2nd conveyance object -- ** -- a polyurethane sheet manufacturing installation given in claim 25 thru/or any 1 term of 29 which has a cutting means to cut crosswise [both].

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram of the polyurethane sheet manufacturing installation by the 1st operation gestalt of this invention.

[Drawing 2] It is the outline block diagram of the polyurethane sheet manufacturing installation by the 2nd operation gestalt of this invention.

[Description of Notations]

1 21 Base material

2, 22a, 22b Exfoliation sheet

3, 23, 43 Mixing head

4 24 Base material feed roller

5, 25a, 25b Exfoliation sheet feed roller

6a, 6b, 26a, 26b, 46a, 46b Coating roller

7 Resin Bank

8 Nip Roller

9 29 Auxiliary heating furnace

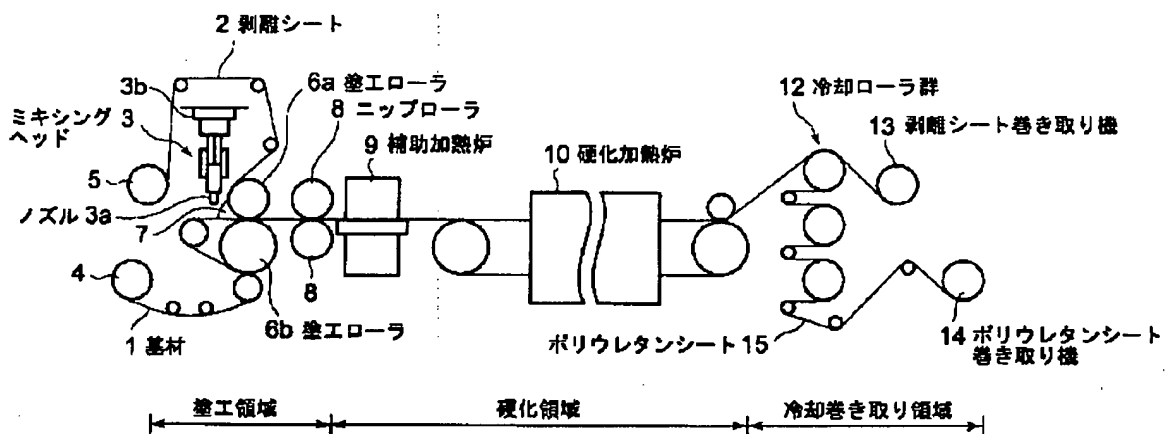
10 30 Hardening heating furnace

12 32 Cooling roller group

13, 33a, 33b Exfoliation sheet winder
 14 34 Polyurethane sheet winder
 15 Polyurethane Sheet

[Translation done.]

Drawing 1



Drawing 2

